

Name: \_\_\_\_\_

## at1124exam: Radicals and Squares (v928)

### Question 1

Simplify the radical expressions.

$$\sqrt{63}$$

$$\sqrt{28}$$

$$\sqrt{44}$$

$$\frac{\sqrt{3 \cdot 3 \cdot 7}}{3\sqrt{7}}$$

$$\frac{\sqrt{2 \cdot 2 \cdot 7}}{2\sqrt{7}}$$

$$\frac{\sqrt{2 \cdot 2 \cdot 11}}{2\sqrt{11}}$$

### Question 2

Find all solutions to the equation below:

$$2((x - 9)^2 + 9) = 90$$

First, divide both sides by 2.

$$(x - 9)^2 + 9 = 45$$

Then, subtract 9 from both sides.

$$(x - 9)^2 = 36$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 9 = \pm 6$$

Add 9 to both sides.

$$x = 9 \pm 6$$

So the two solutions are  $x = 15$  and  $x = 3$ .

### Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 18x = 63$$

$$x^2 + 18x + 81 = 63 + 81$$

$$x^2 + 18x + 81 = 144$$

$$(x + 9)^2 = 144$$

$$x + 9 = \pm 12$$

$$x = -9 \pm 12$$

$$x = 3 \quad \text{or} \quad x = -21$$

### Question 4

Any quadratic function, with vertex at  $(h, k)$ , can be expressed in vertex form:

$$y = a(x - h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 5x^2 + 30x + 38$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 5 .

$$y = 5(x^2 + 6x) + 38$$

We want a perfect square. Halve 6 and square the result to get 9 . Add and subtract that value inside the parentheses.

$$y = 5(x^2 + 6x + 9 - 9) + 38$$

Factor the perfect-square trinomial.

$$y = 5((x + 3)^2 - 9) + 38$$

Distribute the 5.

$$y = 5(x + 3)^2 - 45 + 38$$

Combine the constants to get **vertex form**:

$$y = 5(x + 3)^2 - 7$$

The vertex is at point  $(-3, -7)$ .